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ABSTRACT

The purpose of this study was to clarify the psychological impact of nuclear issues education on preadolescents in order to obtain data that might be useful in developing public policy concerning the role of nuclear issues education. Teachers presented "Choices," an educational unit on nuclear war and conflict, to sixth, seventh, and eighth grade students, and the effects of the unit on both teachers and students were evaluated with pre- and post-tests. "Choices" was developed to help students understand the power of nuclear weapons, the consequences of their use, and options available to resolve conflict among nations by methods other than nuclear war. The program's purpose is to equip students with the skills and knowledge needed to understand that there are choices are available for achieving world peace. This paper describes the study's methods, procedures, and results. The findings indicated that use of "Choices" tended to reduce teachers and students' fears and sense of futurelessness and powerlessness and increase their optimism about the possibility of preventing nuclear war. Both students and teachers moved toward the political left in that they showed an increased understanding of other countries' viewpoints and favored a policy of freezing, reducing, or eliminating nuclear weapons. Fifty-five references are included. (Author/JHP)

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The Psychological Impact of an Educational Unit about Conflict and Nuclear War on Adolescents*

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The Psychological Impact of an Educational Unit about Conflict and Nuclear War on Adolescents

Daniel J. Christie and C. Patricia Hanley

Abstract

Teachers presented "Choices," an educational unit on conflict and nuclear war to sixth, seventh and eighth grade students and evaluated the effects of the unit with pre- and post-tests. The unit decreased adolescents' fear and worry about nuclear war and increased their optimism about the possibility of preventing nuclear war. "Choices" also influenced students politically by moving their viewpoints toward the political left. Results are discussed in the context of policy issues related to nuclear education.

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The Psychological Impact of an Educational Unit about Conflict and Nuclear War on Adolescents

In 1946, when Albert Einstein[12] noted that the unleashed power of the atom had changed everything "save our modes of thinking," scientists and educators were already grappling with the question of what this new form of thinking might be like. Between 1945 and 1947, 120 articles burst forth from education journals as authors presented their views on the bomb; both left wing as well as right wing political viewpoints were represented. Despite political polorization on the nuclear issue, most would agree that the pursuit of peace was the most important goal for humankind, and that everything else had to be given a lower priority.[18]

More than 40 years have passed since the bombing of Hiroshima and Nagasaki. And while the arms race and attendant technological innovations have pressed ahead at a staggering pace, evidence for a new form of thinking is meagre. Instead of spawning a new form of thinking, American education has tended to minimize the value of nuclear education. Consider, for example, the contents of textbooks that are commonly used in social science courses as an index of what is important to social science teachers. Studies assessing the impact of the nuclear age on textbooks have noted that there is a paucity of space given to nuclear issues.[15,16,53] And those few textbooks that allude to "the bomb" often do so in a cursory way, suggesting that its development was one of the elements contributing to the

winning of the Second World War.[15] In short, it seems fair to conclude, as others have, that the information students receive about nuclear weapons and nuclear war as reflected in widely used social science textbooks is inadequate, misleading and perhaps even irresponsible.[15] Not surprisingly, American youth have been found to be woefully ignorant about nuclear issues.[54,55]

Evidence indicating a dearth of textbook material on nuclear issues is not meant to suggest that individual and organizational initiatives have not been forthcoming; they have. For example, the 1986 edition of Peace Resource Book, which is published by the Institute for Defense and Disarmament Studies,[26] provides a list of 17 educational curricula and teaching guides, most of which are appropriate for junior high and high school students. At the higher education level, the Institute for World Order[27] has recently published the fourth edition of Peace and World Order Studies: A Curriculum Guide, replete with essays and a sample of course syllabi for faculty teaching in the field.

Notwithstanding a number of educational initiatives, public policy has lagged well behind the pace of technological change. Without such a policy, educational initiatives are likely to remain uncoordinated and short-lived. In contrast, a clearly articulated public policy on nuclear education could lend legitimacy, direction and support to educational initiatives. At issue, however, is the basic question of whether or not U.S. public policy ought to include provisions that would sanction the teaching of nuclear education in the schools.

One purpose of the present study is to begin the process of clarifying the psychological impact of nuclear education on

adolescents. It is our contention that the formulation of a coherent public policy on nuclear education has been impeded by the lack of empirical evidence that can be used to inform debate on the issue. Ultimately, a well informed decision about policies related to nuclear education should be based on the way in which instruction along these lines affects the behavior and thought of American youth. At the present time, instead of informed debate, speculation is rife in discussions about the impact of nuclear education. Accordingly, it is not surprising that where one stands on the question of institutionalizing nuclear education is heavily dependent upon underlying ideological commitments and whatever happens to be the prevailing political climate.

Paul Kimmel[29] has delineated two general ideological approaches that seem to underlie discussions of nuclear education: (a) the "peace through strength" (PTS) versus (b) "peace through cooperation" (PTC) approach. Those who are ideologically committed to PTS hold a particular world view or Weltanschauung based on assumptions about human nature and society. In particular, proponents of PTS take a Hobbesian view of the world. Individuals and societies are assumed to be inherently competitive, conflicts are thought to be inevitable, and in most conflicts, one side wins while the other side loses. Given the nature of man and society, one would not expect an international government to ever be effective.[30] Hence, in the nuclear age, the only reasonable policy of the federal government is peacekeeping through nuclear deterrence.

The PTC approach to policy is based on a more Lockean set of assumptions about human nature and society; that is, competitive behaviors are learned, as are cooperative patterns of behavior. Based on a win/win model, the PTC Weltanschauung emphasizes the importance of negotiation and compromise. World community is possible, indeed desirable. And the key function of the federal government in the nuclear age should be peacemaking through negotiation.

Because of these antithetical world views, attempts to formulate a coherent and consistent public policy on nuclear education have been stymied. For the question of political bias inevitably arises when curricula are introduced. To complicate matters, the American public vascillates greatly between political poles depending on the prevailing political climate.

Consider, for example, the trend in public opinion between 1945 and 1982. The notion that peace can be ensured through military strength was given a major boost when President Truman[49] announced in 1945 that the U.S. public had just "spent two billion dollars on the greatest scientific gamble in history and won". Generally, Americans shared these sentiments as public opinion strongly favored adding to the U.S. nuclear arsenal rather than trying to put the genie back in the bottle. However, in 1982, faced with the prospect of strategic nuclear parity between the superpowers, most of the U.S. public would come to favor a halt in the arms race.[50]

Social and behavioral scientists as well as mental health practitioners have not been immune to historical changes in the political climate. While professing to hold an enduring commit-

ment to human welfare, interest in nuclear issues as indicated by research activity and publications tends to vary with the degree of chill in the cold war climate. Morawski and Goldstein[37] have examined trends in North American psychologists' concern about nuclear issues and have made the point that sporadic bursts of activity vary with modulations in government policy. During the 1950s, for example, most research and practice supported the U.S. government's right wing orientation. Psychologists worked alongside government and military officials as they sought to measure public attitudes toward atomic energy,[7] and to rid military personnel of their reluctance to participate in atomic maneuvers through fear reduction techniques.[42,43] In contrast, the early 1960s witnessed a change from preparation for war toward the prevention of war.[16,41] In addition, the policy of deterrence was criticized by scholars who argued that such a policy was wracked with paradoxes and inherently unstable.[9,36,40,41]

Interest in nuclear issues waned in the 1970s. Perhaps scientists and practitioners still cared about nuclear issues; however, it seems likely that other social issues (e.g., the Vietnam war, and the feminist movement) were more salient than the threat of nuclear war. A reawakening of interest in nuclear issues emerged in the 1980s as psychiatrists and social scientists turned their attention toward the psychological consequences of living in the nuclear age[31,32,33] and the prevention of nuclear war.[10,32]

Much of the research in the 1980s has investigated the

impact of the nuclear threat on children and adolescents. Studies have been completed in several countries and taken together they suggest that children are aware of the threat of nuclear war and are concerned about the possibiity of nuclear war.[3,6,14,19,20,44] Although childrens' psychological reactions to the threat vary across individuals and countries, several reactions are quite rhobust: fear, powerlessness, helplessness, and denial. In responding to the mental health implications raised by such findings, the most consistent intervention advocated by professionals is education.

While a variety of motives underlie the plea for nuclear education, many professionals support their position by arguing that social responsibility obligates them to do all they can to promote nuclear education. Professionals, it is argued, have a responsibility to expose society to realities such as the nuclear threat[44] and to provide information so that the populace can critically analyze nuclear issues in an informed way.[13,35] Further, it is argued that an informed public is essential to counteract a follower mentality by which is meant the tendency to let the experts make all the decisions related to nuclear issues.[45] Beardslee and Mack[3] make the following point with respect to social responsibility and the potential of education: "It is the responsibiity of the adult generation to give our youth the opportunity to truly participate in the national debate on nuclear issues" (p. 92).

One of the more stinging indictments of American education has been framed by Markusen and Harris[35] who suggest parallels between the exploitation of education in Nazi Germany to

rationalize and implement "The Final Solution" and the exploitation of education in the United States to legitimize and rationalize the preparations for mass killing on a much greater scale than ever before envisioned. While educational policy in Nazi Germany was aimed at increasing the acceptance of genocide, U.S. educational policy may be actually contributing to the momentum toward nuclear war by its passive avoidance of nuclear issues.

Similarly, in the academy, the issue of social responsibility looms large for those who have taken the initiative to offer courses on nuclear issues. Rationales for such courses vary from the highly impassioned type that emphasize the urgency of education on the topic and the dire consequences should a nuclear war occur[24,25,46] to less emotive kinds of rationales that emphasize the importance of an informed citizenry.[22,24] Robert Lifton[32] puts it this way: "I am part of a university. And from that vantage point I must acknowledge an absurdity, and a moral and intellectual scandal of similar magnitude, in the failure of our centers of knowledge and learning -- of scholars, teachers, and students -- to address seriously our general predicament" (p. 6).

In addition to social responsibility, professionals have argued for nuclear education on the grounds that it is worthwhile as a psychotherapeautic intervention. Exposure to the reality of our nuclear and global crisis can move individuals toward accurate perceptions and away from psychic numbing, denial, distortion, and the trivial disctractions of everyday life.

Although exposure will engender feelings of anxiety, despair, and hopelessness, it is maintained that such feelings will give way to hope, responsibility, and peaceful action as the individual perceives truth and experiences a sense of empowerment.[39] From a psychotherapeautic point of view, knowledge of nuclear issues is worthwhile because it can give young people a "sense of control over the experience they have growing up in the nuclear age"[3] (p. 91) as well as a sense of hope and responsibility.[2]

But the most frequent exhortation regarding the value of nuclear education takes the form of an argument that posits a relationship between fear and ignorance.[3,4,20] As participants in the American Psychiatric Association's Task Force on Psychosocial Aspects of Nuclear Developments, Beardslee and Mack[3] discussed the implications of their work on the impact of nuclear developments on children and adolescents in the following way: "We need to educate our children to the realities of nuclear...weaponry so that they can be helped to overcome at least that aspect of fear which derives from ignorance and which leaves them feeling so powerless" (p. 91).

Similarly, when Goldenring and Doctor[20] offered testimony to the House of Representatives Select Committee on Children, Youth and Families, they stated that, "There appears to be a communication gap which adolescents are filling with fear instead of hope. This is occurring because we are not talking to youth about the nuclear threat and we are not convincing them by word and dead that there is hope for their future. And like other topics...the threat of nuclear war is ignored in the home and in classrooms with the result being misinformation, despair,

unwarranted fantasies and sometimes acting-out behavior."

In 1982, the National Education Association and the Union of Concerned Scientists developed an educational unit on conflict and nuclear war entitled Choices.[49] In the fall of 1982, the unit was field tested by 47 junior high school teachers in 35 states. Although other units and curricula on nuclear war exist, no other educational project has generated as much heat as Choices, particularly when proponents and opponents get together and debate the likely impact of Choices on the attitudes and psychological well-being of adolescents.

The purpose of Choices as presented in the introduction to the teachers' guide[49] is "to help students understand the power of nuclear weapons, the consequences of their use, and most importantly, the options available to resolve conflict among nations by means other than nuclear war.... The unit is not intended to advance specific political positions. Rather, it contains age-appropriate materials that will help equip students with the skills and knowledge to understand what choices can be made to ensure a peaceful and secure future for the United States and the world" (p. 7).

The content of Choices seems to allign with the political left or the PTC Weltanschauung. Ideas such as compromise through negotiation and the need for trust in U.S.-Soviet relations are emphasized. PTS ideas such as viewing the Soviet Union as an intractible enemy that is single-handedly responsible for armaments on both sides or the view that peace can be ensured through ever increasing nuclear arsenals is discouraged.

Critics of Choices argue that the unit is politically biased and induces fear in the learner. One critic, for example, argues that the unit advances a left wing position in its portrayal of the U.S. as the villian in the arms race.[47] The unit has not escaped criticism from President Reagan (cited in Kimmel[29]) and in an article published in Human Events: The National Conservative Weekly, Gary L Bauer, Deputy Undersecretary of Education, described the content of the unit as "material... intended to produce Pavlovian resistance to the notion of peace through strength." (cited in Lynn[34])

Some critics charge that the unit frightens and brainwashes American school children.[34] Presumably, the unit has prompted thousands of youngsters to write letters to President Reagan and in one such mail delivery in the summer of 1983, some 800 letters were received by the White House. According to one critic,[47] "many of these letters...(were) pathetic, inarticulate and ungrammatical expressions of youthful fear." (p. 11)

Proponents of Choices argue that political endoctrination of the right wing genre already pervades American education.[5] Others argue that the content of Choices redresses the tendency of traditional textbooks to ignore the world views of other nations.[28]

With regard to the unit's impact on fear, John Mack's[49] view as expressed in the foreward to the unit would seem to be in direct opposition to critics who charge that the unit creates fear: "Choices will help young minds visualize and experience the nuclear reality in a way that is not threatening....Having grasped the truth...action that will set us free will follow."

It seems likely that the discrepancy between arguments expressed by proponents and opponents of nuclear education, and of Choices in particular, is largely due to political differences (biases) rather than any sound empirical evidence regarding the psychological impact of the unit. The current research is designed to begin the process of amassing a body of empirically based evidence that sheds light on the psychological impact of education on nuclear war. To this end, we begin by evaluating the psychological effects of Choices on adolescents.

Method

Dependent Measures:

Adolescents' reactions to the unit on nuclear war were assessed both prior to the presentation of the unit and after its presentation. The assessment consisted of a 17 item questionnaire and a 25 item inventory.

Adolescents were asked to respond to each item on the 17-item questionnaire using a Likert type scale (e.g., Do you think Russians are the bad guys and Americans are the good guys? (1) Definitely No (2) Probably No (3) Unsure (4) Probably Yes (5) Definitely Yes). Some questionnaire items were identical to those used in previous studies.[20,21] Other items were developed because of their relevance to the debate about nuclear education or because they were seed items that were thought to reflect factors that would be measured by the inventory.

The 25 item inventory entitled "Nuclear Anxiety Inventory for Adolescents" (NAI-A), was constructed to provide multiple measures of adolescents' reactions to the threat of nuclear war.

The NAI-A was field tested with 726 sixth, seventh, and eighth grade students. The inventory is internally consistent and measures three factors: fear, futurelessness, and powerlessness.[23]

Teachers reactions to the educational unit were assessed by administering pre- and post-measures of an activism scale designed to measure the level of activism adults exhibit with respect to the nuclear arms race.[31]

Participants

A total of 42 teachers presented the unit to 1,518 sixth, seventh, and eighth grade students in Ohio. Teachers presented the unit to a minimum of one section of students; the maximum number of sections per teacher was five. The subject area most frequently represented by the teachers was social studies followed by English. Most of the teachers reported that their schools were located in urban areas (i.e., population greater than 100,000); the remaining were about evenly divided between small cities and rural areas. Of the 42 teachers, 26 reported that their school population consisted of middle-class students; 13 indicated lower-class; three reported upper-class. In terms of racial composition, 25 teachers reported that their students were all white; 12 reported that they taught racially mixed classes with a white majority; three of the 42 teachers reported a racial mix with a black majority; two teachers indicated that their classes were about half white and half Southeast Asian. The number of teachers who taught in Catholic schools was 16; the remaining taught in public schools. A wide range of student

ability levels, including gifted and remedial, were reported.

Procedures

A packet of information describing the project was sent to 54 principals and 12 superintendents across Ohio. An attempt was made to include a representative sample of both rural and urban areas as well as private and public schools. Principals and superintendents were asked to read the packet and pass it on to teachers who may have interest in participating in the project. Included in the packet of information was a brief description of the project, its sponsor, the role of teachers, a summary of the lessons in Choices, a statement of the purposes of the project, and a teacher application form. The application form contained questions about subject area taught (e.g., English, social studies, etc.), grade level taught, approximate number of students to whom they would like to present the unit, and the reasons why they were interested in participating in the project. Teachers signed and returned to the project director a statement of agreement which committed them to attend two workshops, one before and one after presenting the unit to their students. Teachers were required to present the unit at their convenience; however, it was stipulated that the presentation would have to occur sometime between April 12 and May 10, 1986. They were also informed that it would take a two week block of time to present. Each teacher who participated in the workshops received an honorarium of $100.

Follow-up telephone calls were made to about half of the principals and superintendents to ensure that they were passing on the information packet to prospective participants and to

estimate how many teachers were interested in participating in the project. Most administrators indicated they were passing on the information to interested teachers; a few principals indicated that they would need approval from their superintendent or school board; a few others thought it would be too controversial to introduce the unit in their school.

Based on the follow-up queries, a batch of packets were sent to 65 more principals and four more superintendents. A total of 55 teachers either called to express their intent to participate or returned an application form. The final number of application forms received by the project director was 46; the total who participated was 42.

Workshop I. The first workshop for teachers was held on April 12. After welcoming them and making introductions, an overview of the agenda was provided. Subsequently, teachers filled-out the Activism Scale. Then, they were introduced to nuclear issues by way of a 90 minute lecture, followed by a short break. Upon returning to the classroom, an overview of the project was provided along with specific written instructions on how to administer the pre- and post-test student measures.

Near the end of the first workshop, we asked for volunteers who would serve as a control group. We explained the need to have about eight sections of students who would comprise the control group. Eight sections of students were volunteered by seven teachers. Teachers were informed that the control group was to be administered pre- and post-tests spaced two weeks apart; however, in contrast with other sections, control sections

were not to have the Choices unit presented to them in between pre- and post-tests. Teachers who participated in the control group had the option of presenting or not presenting the Choices unit. If they chose to present the unit, they did so after the pre- and post-tests had been given.

Before teachers' departed, some ethical issues were considered. In particular, teachers were requested to send home with each child a description of the unit that would be covered in class. Although parents were not required to give written consent for their children to participate, they were informed that if they had any objections to their child's participation, provisions would be made to have their children do some alternate activity while the teacher provided instruction on nuclear issues to others in the class. A total of 11 parents wrote positive comments to teachers; two parents called and commended the teachers for covering such an important topic. Three wrote negative comments to teachers but did not request to have their children given an alternate activity. The negative comments were substantively equivalent to the following: (1) teachers should teach school, parents should teach patriotism, (2) this topic could cause my child to have nightmares, and (3) I was afraid of the end of the world as a child and I don't want my child to grow up being afraid of the end of the world.

Three parents chose to have their children do an alternate activity: two of them wrote that the nuclear issue was a "private matter" that should not be dealt with in school; the other one wrote that she didn't have enough information about the project. The teacher thought about providing more information but after

talking with the principal it was decided that the matter would not be pursued any further.

To ensure the confidentiality of students reactions to the questionnaire and inventory, teachers were asked to assign a number to each student, to save the list of student names and numbers in a safe place, and to have students use their personal number on every pre- and post-test measure. When teachers turned in student data to project personnel, only the numbers were used to identify data sheets.

Teachers departed from the first workshop with two articles on nuclear education (viz., "Helping Children Think About the Unthinkable"[4] and "How Will You Teach Your Class About Nuclear War"[11]), copies of the 25 item nuclear inventory, copies of the 17 item questionnaire, a copy of the unit Choices, a project evaluation form, written instructions for administering the questionnaire and inventory, and blank answer sheets to be used for students' responses. Later, the answer sheets would be scanned by computer for data analyses.

Workshop II. On May 10, teachers returned for the second workshop, the purpose of which was to (a) readminister the Activism Scale, (b) collect the data teachers obtained from their students, (c) evaluate the project using a discussion format, (d) collect written project evaluation forms from the teachers, and (e) remunerate teachers for participating in the project.

For data analysis purposes, two student assistants were employed. They were responsible for preparing the data for computer analyses. Student assistants discarded answer sheets

for which there was not both a pre- and post-test pair. They also coded answer sheets (e.g., teacher's number, sections, etc.) and performed various "clean up" duties: erasing smears and stray marks, changing pen to pencil marks, pressing answer sheets flat, etc.

Results

Analysis of the Inventory

The differences between pre- and post-test scores on fear, futurelessness, powerlessness, and the whole scale were statistically analyzed with separate t-tests for each class section. The general trend for students who had been exposed to the unit on nuclear war was toward decreases in all of the factors measured by the inventory. In particular, statistically significant decreases ($p<.05$) were obtained in 42 out of 67 sections of students on the fear factor, 30 out of 67 sections for futurelessness, 33 out of 67 sections for powerlessness, and 40 out of 67 sections for the whole scale.

Similar patterns emerged for the control group sections: 6 of 8 sections significantly declined on fear; 4 of 8 on futurelessness; 3 of 8 on powerlessness; and 6 of 8 on the whole scale.

To explore possible differences in the magnitude of changes between the control group versus those groups that received instruction on nuclear issues, the following data analysis was carried out: First, because of the large data base and limitations imposed by the capacity of computer memory, the data were transformed into change scores; these were calculated by finding the difference between each student's pre- and post-test

score on each of the scales (i.e., fear, futurelessness, powerlessness, and whole scale). Then, an analysis of variance (ANOVA) was applied to the data to ascertain which variables contributed significantly to the change.

Insert Table 1 about here

Table 1 presents a summary of the ANOVA table for changes in fear. The ANOVA on fear change scores yielded a significant main effect for "condition" (i.e., nuclear vs. non-nuclear education group); the direction of difference indicates that the reduction of fear that occurred during the course of the present study was greater for students who received nuclear education than students who did not. In addition, as indicated in the table, a significant grade x sex interaction was obtained. The application of Cichetti's post test to the interaction indicated that the decline in fear was particularly pronounced in female sixth graders ($p<.05$). No significant differences were obtained for futurelessness, powerlessness, or for the whole scale.

Analysis of Questionnaire Items

The analysis of questionnaire items corraborates and extends the findings from the analysis of inventory data. Since questionnaire data correspond to ordinal level information, a sign test (Wilcoxon) for differences between pre- and post-test scores was computed. The sections that participated in nuclear education exhibited statistically significant changes on a number of questions which are presented in Table 2.

Insert Table 3 about here

The control group exhibited significant changes ($p<.01$) on two items: (1) "How upset by the threat of nuclear war are you?" and (2) "How much are you afraid about nuclear war?" The direction of the change indicated that students declined in their degree of upsetment and fear.

Analysis of Teachers' Data: Activism

The Activism Scale[31] consists of two subscales and a bi-polar scale. One subscale provides a measure of "anti-nuclear activism"; the other subscale measures "pro-nuclear activism". The bipolar scale provides an overall index of activism irrespective of the direction of the activism. All three measures of activism were statistically analyzed with a t-test for repeated measures (pre- versus post-test). The only significant difference was obtained for the anti-nuclear subscale ($t = 1.847$, $p<.05$), thereby indicating that teachers were more actively opposed to the arms race after having presented the unit.

Discussion

Choices and, more broadly, nuclear education have been criticized for inducing fear and for politicaly endoctrinating children. As Voth[30] has put it: "these programs can only scare the wits out of young people" (p.8). Similarly, Adelson and Finn[1] have concluded that those who develop such curricula do so in an attempt to "terrify children" and to endoctrinate them into their own ideological viewpoint. Further, they accuse those who develop curricula of "the abuse of children and of "gratuitous sadism" (p. 34).

In contrast to the aforementioned views, the most consistent finding of the current study is that adolescents exposed to the Choices unit decline in their fear of nuclear war. Accordingly, the results allign more closely with those who contend that educating our children about nuclear issues leads to a reduction of fear, presumably because much of their fear is due to ignorance.[3,20]

Our decision to have eight sections of students serve as control groups was based on the concern that there might be international crises that occurred between the pre- and post-test sessions. As it turned out, the political environment was indeed quite turbulent. Teachers participated in the first workshop on April 12; on April 15, the U.S. invaded Libya. Telephone calls to teachers verified that eight teachers, who had 12 sections of students, administered the pre-test on the day of the invasion. Five of the teachers (six sections) were in the control group. In addition to the invasion, the Chernobyl reactor problem emerged and the drama was played out over national television almost precisely coincident with the dates for the two workshops.

In view of these major international events, it hardly seems surprising that both the treatment and control groups declined on inventory measures of fear, powerlessness, and futurelessness over the course of the study. Similarly, both groups reported that they worried less about the threat of nuclear war and were less upset by the threat at the time of their second testing as contrasted with the first.

While it seems plausible that trends toward lower levels of

fear, powerlessness, and futurelessness for the control groups could be accounted for by major political crises that reached their peak around the point in time when pre-tests were administered, we have little evidence that bears on this possibility. In an attempt to tease out the impact of the Libyian invasion, students who were administered the inventory on the day of the invasion were compared to those who took the inventory on days following the invasion. No significant differences were obtained on any of the inventory factors (i.e., fear, powerlessness, futurelessness, or whole scale). And although the reactor fire at Chernobyl may have significantly elevated students' scores on the pre-test, it was not possible to evaluate the impact of the disaster because it did not take place as a discrete event over a short period of time; instead, the story gradually unfolded over the course of the study.

A rival hypothesis that could be used to explain concommitant changes in the control group is that the inventory is unreliable when used as a repeated measure. While the internal consistency of the inventory was adequate, we have not obtained data on reliability in test-retest sense. However, while it is conceivable that self-reported ratings of reactions to the threat of nuclear war decline when administered repeatedly, the significantly greater change in fear for the treatment group as compared to the control indicates that the inventory does discriminate between the magnitude of fear reported by adolescents. In short, adolescents who were administered the unit exhibited a significantly greater reduction in fear than did adolescents in the control groups.

Whether or not nuclear education affects adolescents' feelings of futurelessness and powerlessness remains equivocal. Perhaps nuclear education has little impact on psychological variables akin to futurelessness and powerlessness. Alternatively, it is possible that the changes in the control group obscured some ot the psychological changes experienced by adolescents who were presented the unit.

The analysis of questionnaire responses yielded a number of significant trends for those students who were exposed to the Choices unit. First, students reported that they worried less often about the threat of nuclear war after the unit was presented as contrasted with how much they worried prior to the presentation of the unit. Second, after exposure to the unit, students felt more certain that "nuclear war between the U.S. and Russia can be prevented," that is, more certain than they did before the unit was presented. Perhaps students became more empowered as they learned about conflict and nuclear war. Another possibility is that the unit led students to believe more strongly that nuclear war could prevented by inducing them to change their assessment of the degree of stability in the current configuration of power across the world.

Those who were administered the unit talked "with others" and "with friends" about the threat of nuclear war more often after having participated in Choices. Taken together, these findings indicate that students are likely to respond to Choices with a decline in fear and concern about the possibility of nuclear war. In addition, they are likely to verbalize their

concerns and to become more empowered in the sense that they experience greater optimism about the prospect of preventing nuclear war between the U.S. and Soviet Union. An interesting set of relations are suggested by the current study that corraborates some previous interview studies,[6] namely, being more thoroughly informed about nuclear issues is associated with lower levels of fear and concern as well as a greater sense of being able to do something about the nuclear predicament.

A host of potential causal relationships remain unaddressed empirically by the current research. For example, does "talking with others" about the threat have psychotherapeutic value in the sense that it mediates the reduction of fear and concern and, in the process, empowers the individual. These questions and others bearing on potential causal relations await further research.

Far more controversial are the results of the current study which suggest that students and teachers move toward the political left as a result of learning about Choices. Teachers' scores on the Anti-Nuclear Activism subscale significantly increased as a result of their teaching from the unit. According to the authors of the Activism Scale, anti-nuclear activism represents activities that favor a policy of freezing, reducing, or eliminating nuclear weapons by the United States.

While no specific queries were made about possible changes in students' activity with respect to nuclear weapons, two items on the questionnaire they filled-out suggest that they too moved toward the political left. In particular, they became more sympathetic toward the Soviet viewpoint. After having participated in Choices, students were less likely to agree with

the statement that "Russians are the bad guys and American are the good guys"; instead, they moved toward assigning equal responsibility for the nuclear predicament. Similarly, they moved toward assigning equal responsibility for there being "so many nuclear weapons in the world". Hence, when considering the way in which Choices tends to influence adolescents political views, the weight of the evidence leans toward supporting those who criticize the unit for its left wing political orientation.

Notwithstanding the political bias of Choices, evidence from the current study indicates that the unit it not harmful in a psychological sense. Participation in Choices seems to be beneficial to students in a variety of ways, the most notable of which includes fear reduction, enhanced optimism about the probability of avoiding nuclear, and decreases in the frequency with which they worry about the possibility of nuclear war.

With regard to the broader issue of nuclear education policy, the present study suggests that modest psychological benefits result from increasing adolescents' knowledge of nuclear war and conflict. Yet, the policy issue is likely to remain the subject of heated debate for some time. There are proponents of nuclear education who maintain that a course on nuclear issues ought to be required for graduation in high school and college;[16] some even urge more sweeping reforms by suggesting that nuclear issues and peace education should be on the public policy agenda of all nations.[17]

On the other hand, there remains concern that nuclear education will undermine the belief that peace is best ensured

through strength, which could ultimately force the U.S. into a militarily weak and vulnerable position. Further, as Kimmel[29] has pointed out, there is a tendency to construe peace through strength and peace through cooperation as antithetical and incompatible with one another. Would it not be possible to support both nuclear education and a strong defense?

While a greater understanding of the ideological underpinnings of the nuclear debate might help clarify from whence the heat originates, the intent of the current research was to begin the process of generating an empirical base for sorting out issues related to public policy and nuclear education. Rather than being guided by ideological considerations, it seems likely that more predictable outcomes will follow from policy based on empirical evidence.

The present work is limited in a number of ways, not the least of which is the constraint on generalizations that can be made on the basis of a study conducted with one specific nuclear education unit. It would be well for future research to expand the number of units tested as well as the dependent measures employed not only to enhance our understanding of the impact of nuclear education on students, but also to more generally establish relationships between variables such as ignornance, fear, empowerment, and the like.

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Table I. Changes in Fear as a Function of Grade, Condition, and Sex (N = 1,406)

Source of Variation	df	SS	F
Grade (G)	2	61.86	.58
Condition (C)	1	234.10	4.42 *
Sex (S)	1	122.30	2.31
G X C	2	170.20	1.61
G X S	2	395.76	3.74 *
C X S	1	44.50	.84
G X C X S	2	75.25	.71

*$p < .05$

Table II. Questionnaire items that yielded significant changes (pre to post testing) for the nuclear education group.

No.	Item	Direction of Numericial Change
26.	How often do you worry about the threat of nuclear war? (1 - all the time... 5 - never)	Increase **
27.	How upset by the threat of nuclear war are you? (1 - very upset... 5 - not at all upset)	Increase **
28.	How much are you afraid of nuclear war? (1 - very afraid... 5 - not at all afraid)	Increase **
32.	How often have you talked to others about the threat of nuclear war? (1 - not at all... 4 - almost every day)	Increase **
33.	Do you think the Russians are the bad guys and Americans are the good guys? (1 - definitely no... 5 - definitely yes)	Decrease **
35.	Do you think nuclear war between the United States and Russia can be prevented? (1 - definitely no... 5 - definitely yes)	Increase *
40.	How much do you talk with friends about nuclear war? (1 - none... 4 - almost every day)	Increase **

42.	Why are there so many nuclear weapons in the world? (1 - because of the Russians... 3 - because of the Americans)	Increase *

*p<.05
**p<.01